United States General Accounting Office

GAO

Report to Congressional Committees

September 2001

DEFENSE MANUFACTURING TECHNOLOGY PROGRAM

More Joint Projects and Tracking of Results Could Benefit Program

G A O

Accountability * Integrity * Reliability

GAO-01-943

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United States General Accounting Office
Washington, DC 20548

September 28, 2001

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Ranking Minority Member,
Committee on Armed Services
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The Secretary of Defense established the Defense Manufacturing Technology (ManTech) Program to develop and apply advanced manufacturing technologies to reduce the total cost and improve the manufacturing quality of weapon systems. By maturing and validating emerging manufacturing technology and transferring it to the factory floor, the program bridges the gap between technology invention and industrial application. The program has existed in various forms since the 1950s and was funded at about $200 million in fiscal year 2001.

The Department of Defense (DOD), Office of the Under Secretary of Defense (Science and Technology), provides guidance and oversight to the Army, Navy, Air Force and the Defense Logistics Agency (DLA), but each establishes its own policies and procedures for operating the program and determines which technologies to develop for its weapon systems and other programs. Users of the ManTech Program include program and project managers for defense weapon systems, system commands, depots, air logistics centers, and shipyards. The statute[1] requires the prospective users of the technology to participate in establishing requirements and that

[1] 10 U.S.C. 2521(c)(5).

competitive procedures be used for awarding all grants and entering into all contracts, cooperative agreements, and other transactions under the program. The conference report accompanying the Floyd D. Spence National Defense Authorization Act for Fiscal year 2001[2] directed that we look at DOD's progress in achieving these goals. Subsequent to discussions with your offices, we agreed to determine

- whether projects funded by the program are responsive to the needs of the military services and DLA, and
- whether work being performed under the ManTech Program is being awarded on a competitive basis.

We also assessed whether DOD could manage the program more effectively—specifically with regard to conducting joint projects and tracking the program's success.

To determine whether the program is responsive to user needs, we assessed specific projects underway at each military service and the DLA, and we assessed whether these components had processes in place that would help ensure user needs were met. More specifically, we identified projects for all three services and DLA active in fiscal years 1999 and 2000. We then selected a sample of projects to assess, based on levels of funding, length of the projects, and varying types of technologies and weapons systems. The 52 projects we selected represented about $206 million of the $372 million DOD invested in the program during fiscal years 1999 and 2000. For the selected projects, we interviewed users to determine the extent to which the projects were meeting the needs of their respective services and DLA. We did not validate the reported results of these projects, nor did we discuss the program with representatives from industry. We also reviewed the means by which the services and DLA include the users of prospective technology in the process of identifying potential projects and selecting them for funding. In addition, to determine whether competitive award procedures were used, we examined contract files associated with our sample of selected projects. Appendix I contains further details on our scope and methodology. We conducted our work from December 2000 through June 2001 in accordance with generally accepted government auditing standards.

[2] House of Representatives Report 106-945, Oct. 6, 2000

Results in Brief

Users reported to us that the ManTech program was responding to their needs by developing technologies, products, and processes that reduced the cost and improved the quality of weapons systems. In addition, we found that the military services and DLA have established processes that allow users to play a significant role in identifying and selecting projects for implementation. Such processes increase the likelihood that projects will meet users' needs. However, some ManTech officials expressed concern that funding for the ManTech program was not sufficient to meet users' needs. For example, according to Air Force officials, proposed funding reductions in future years may result in the cancellation or postponement of some projects that were previously approved.

To the extent practicable, DOD uses competitive procedures to award the work performed under the ManTech Program. The Army, Air Force, and DLA competitively awarded most of the projects we reviewed for fiscal years 1999 and 2000, and the remaining non-competitive awards were based on documented sole source justifications. The Navy competes the contracts for operating its Centers of Excellence every 5 years, but the centers' execution of the projects varies. Some centers choose to perform the work in-house or award subcontracts to their industrial partners, while others award competitive subcontracts.

Finally, DOD can manage the ManTech Program more effectively. DOD is missing opportunities to conduct more joint programs and lacks effective mechanisms to measure the program's success. Joint projects would enable the services to address the funding issue raised by some ManTech officials by leveraging limited funding and integrating common requirements and approaches for developing manufacturing technologies. Of the 124 ManTech active projects last year, 100 had the potential to benefit more than one service, but only 16 of the projects were jointly funded or managed. With regard to being able to measure the success of the program, DOD does not track project outcomes, such as the transfer of the technology past the initial implementation. At the direction of the Congress, DOD publishes an annual report, which lists completed projects and the status of their implementation; however, measures of success are not included. Therefore, the Department does not know the full extent of the success of the ManTech Program.

This report includes recommendations to DOD and the services on strengthening efforts to conduct joint ManTech projects and assessing the results of the program. DOD partially concurred with our first recommendation, stating that the Joint Defense Manufacturing Technology Panel already provides an effective model for how to plan, coordinate,

execute, fund, and implement joint ManTech activities. However, DOD acknowledged that more could be done to improve the process for developing joint projects and that it is taking steps to do so. DOD agreed that it needed to develop a more systematic process for determining the results of ManTech projects and will continue efforts already begun in that area.

Background

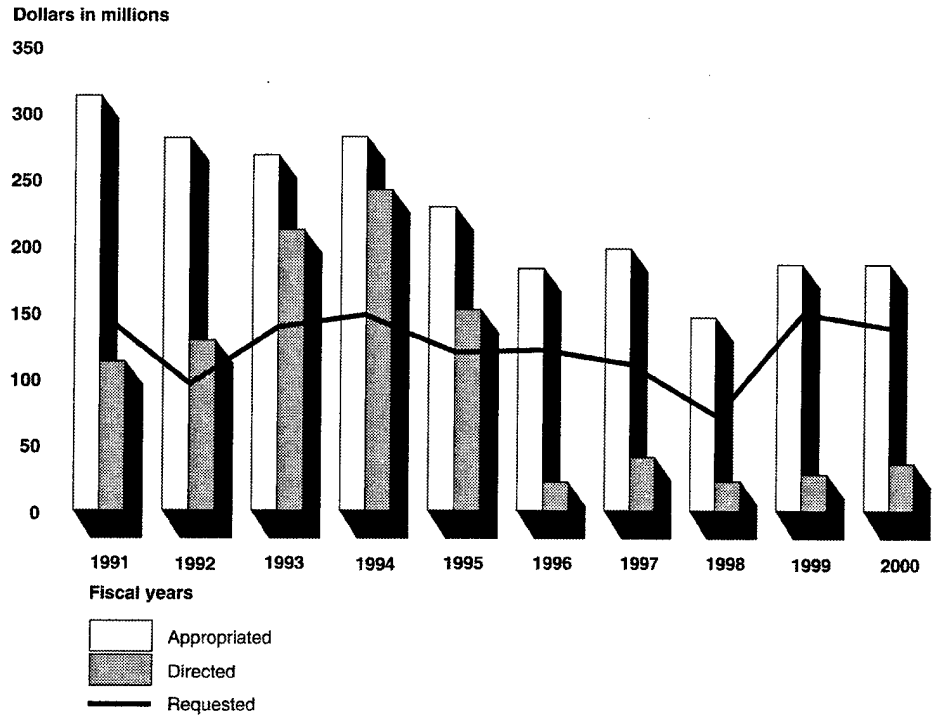
The ManTech Program is designed to enable DOD to develop advanced technologies to use in manufacturing weapon systems. Such technologies, in turn, should reduce weapon system costs and improve quality. ManTech projects address development of technology in areas such as metals, composite materials, electronics, munitions, as well as technology to sustain weapons systems. The users of the ManTech Program are service and DLA managers responsible for the development of new weapons systems and for the repair, maintenance and overhaul of fielded systems. However, the projects are executed through agreements or contracts with several types of organizations including defense contractors, government facilities, suppliers, consortia, centers of excellence, academia, and research institutes.

The military services and DLA execute the ManTech Program under the general direction of the Director, Defense Research and Engineering, Office of the Deputy Under Secretary of Defense (Science & Technology), Office of Technology Transition. Each component has established a ManTech office within its organization to set policies and procedures for operating its ManTech program and determining which projects to fund.

DOD established the Joint Defense Manufacturing Technology Panel, staffed by service and DLA ManTech office personnel, to set program objectives, promote effective integration and program management, conduct joint planning, and oversee program execution. It reports to and receives taskings from the Director of Defense Research & Engineering on manufacturing technology issues of multiservice concern and application. The panel organized the program into subpanels to serve as focal points for specific technology areas.

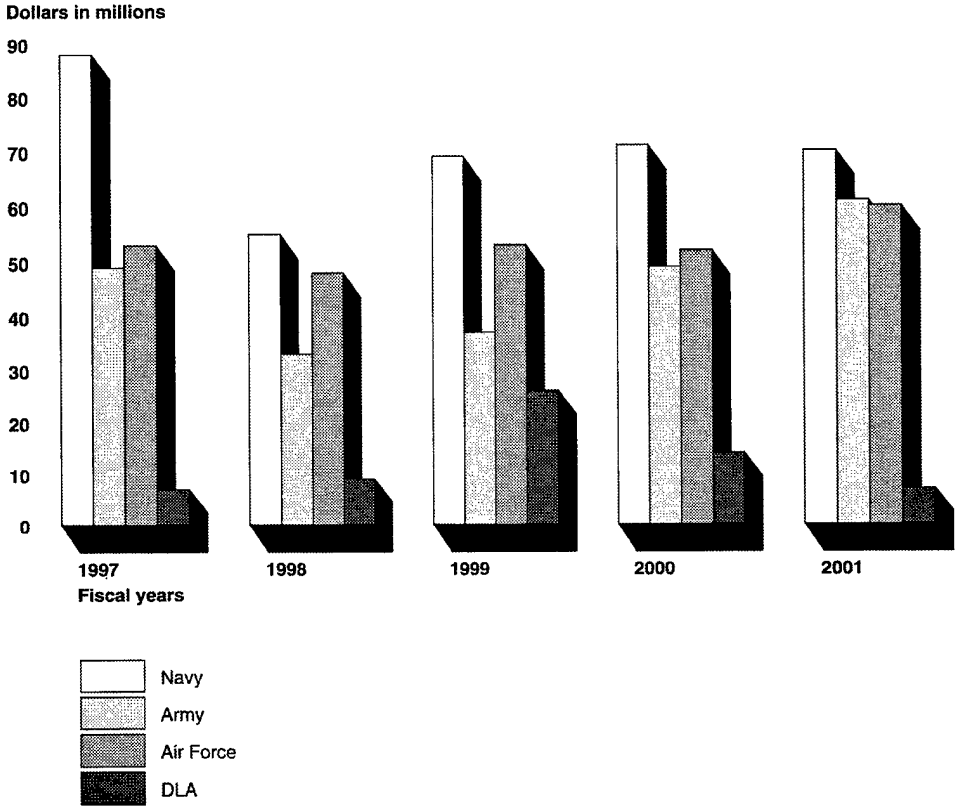
ManTech Program appropriations have fluctuated significantly over the past several years, and annually since fiscal year 1991, the Congress has appropriated more funds to the program than the services requested in the Presidents' budgets. The funding trends for the program since fiscal year 1991 are shown in figure 1.

Figure 1: Amounts Requested and Appropriated Compared to Amount of Funds with Congressional Direction



In addition, funding by DOD component has also fluctuated. Figure 2 shows the funding for the services from fiscal years 1997 to 2001.

Figure 2: Appropriations by Service and DLA



Needs Are Generally Being Met, According to Users and Based on Our Analysis of Project Selection Processes

Users in the military services and DLA look to the ManTech Program to help meet certain needs related to weapons systems they are responsible for, such as developing technologies, products and processes that will reduce the total cost and improve the manufacturing quality of their systems. Users reported to us that the ManTech projects we selected in our analysis were generally addressing their needs. In addition, the military services and DLA have processes in place that include users in the project identification and selection process. Such processes increase the likelihood that projects will meet user needs. However, the extent to which some needs are being met is limited by factors related to each program, such as the amount of funding available.

Users Report That Projects Generally Meet Their Needs

During fiscal years 1999 and 2000, DOD had a total of 234 active ManTech projects valued at about $372 million. From that list, we selected 52 projects in the DOD components valued at $206 million and discussed with users whether those projects were responding to their needs. These users told us that the ManTech Program is generally meeting their needs.

The projects we selected resulted in improvements ranging from a project that developed new technology to reduce the time and cost required to produce submarine and surface ship propellers; to a project that increased the reliability of electrical circuits used in missile systems by protecting them against dirt and moisture; to a project that enabled the Air Force to replace 83 parts in its F-119 engine with one part and reduce the weight of the engine by 54 pounds. By implementing such projects, officials from the military services and DLA told us that they were able to save tens of millions of dollars.

Table 1 provides detailed examples of projects that users reported to us met their needs.

Table 1: Examples of Projects Reported by the Military Services and DLA

Navy	• One project underway for the Naval Sea Systems Command is estimated to reduce the time and cost required to produce propellers for each Virginia Class submarine by 18 months and $3 million, respectively. The command provided some matching funds for the project and has already planned to implement the results of the project immediately upon completion in 2003. The Navy expects the technology to be used for the production of surface ship propellers as well. • A project underway at the Naval Air Systems Command is expected to reduce the cost and increase the quality and reliability of missile parts used to direct the missile precisely to its target. The Navy expects to save $18 million in the Joint Standoff Weapon Program, and the program office has committed funds to implement the project results. The results may potentially transfer to other DOD systems resulting in additional savings.
Army	• One project developed a robotic system for removing metal burrs from precision gears. Engineers for the RAH-66 Comanche helicopter program told us they expect the project to contribute to a reduction in manufacturing time and less waste. The project is expected to lead to a cost avoidance of $1.6 million per year for the RAH-66 Comanche helicopter. • Another project is focused on improving, demonstrating, and implementing a process for coating electrical circuits to seal them against dirt and moisture to increase the reliability of the circuits. Engineers we talked to for two Army missile systems stated that this is an important issue for their programs. The program executive office responsible for developing air and missile systems established an integrated process team to assist in this project.

Air Force	• One Air Force project improved the manufacturing process to make major components of the Joint Air-to-Surface Strike Missile composite fuselage. According to a manufacturing engineer for the system project office, the fuselage sometimes had to be altered in order to fit the other components into it, which resulted in an inconsistent or substandard product. The ManTech effort will result in a fuselage that requires fewer alterations during missile assembly and a cost avoidance of at least $4.4 million. • Another project resulted in one part replacing 83 parts in the F-119 engine, the engine in the F-22. This reduced the weight of the engine by 54 pounds and the technology is also applicable to all future turbine engines.
DLA	• DLA reported that the Marine Corps was able to reduce its inventory of military uniforms at two recruit training centers by 61 percent because of one project to address the issue of retail inventory management. This project resulted in savings of $10.2 million. Based on the Marine Corps' success, the Navy and the Air Force have reportedly expressed interest in the project, according to the project manager. • Another project grew out of a survey of members of a national association representing manufacturers that produce cast metal parts, according to the DLA project manager. The survey revealed that lead time at the foundry was a barrier for delivering high quality castings rapidly. The project developed new casting designs and acquisition processes that resulted in a reduction of lead-time from 56 to 34 weeks.

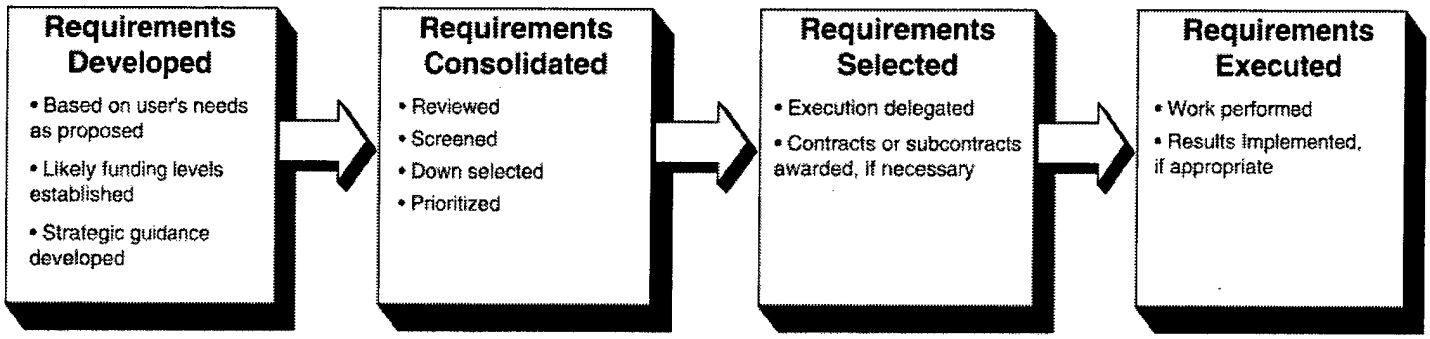
Congress has consistently provided more funding for DOD's ManTech Program than requested in the President's budget. For example, in fiscal years 2000 and 2001, the Army received an additional $66.5 million in ManTech funds, of which $45.5 million or nearly 70 percent was designated for the Army's ManTech munitions efforts. These efforts included such projects as developing a more cost-effective and safer manufacturing process for an advanced explosive compound. The Congress believed such efforts were not receiving sufficient funds in the past.

Users Are Involved in Project Selection, but Processes Sometimes Limit the Extent to Which Their Needs Are Met

The extent to which the ManTech Program meets users needs is due partly to the process by which projects are identified and selected for funding. Furthermore, the statute[3] requires the participation of the prospective technology users in establishing requirements for advanced manufacturing technology. The services and DLA have different planning cycles and criteria for project selection. However, they all have processes that include users in the identification and selection of projects. The processes generally include steps to determine and consolidate users' needs, select the projects to be funded, and perform the work. The following figure depicts the generic ManTech project and identification and selection process.

[3] 10 U.S.C. 2521(c)(5).

Figure 3: Project Identification and Selection Process



Note: This chart reflects the generic process within the components. Because the components' processes differ, not all components execute each step in the same manner.

We found that the number of projects selected for inclusion in the ManTech Program differs from the number proposed because of funding limitations. Most of the funding each year is allocated to projects already underway that require multi-year funding. Only a few proposed projects are selected as new starts. Table 2 shows the number of projects proposed and selected for fiscal year 2001.

Table 2: Number of Projects Proposed and Selected for Fiscal Year 2001

	Projects proposed	Projects selected
Navy	47	9
Army	58	4
Air Force	26	5
DLA	1	1
Total	**132**	**19**

Even though the services and DLA employ different types of selection mechanisms and criteria, they all include users in this process. For example, the Army and the Navy annually solicit ideas for projects from the major subordinate commands where weapons systems are managed. The Air Force encourages users to submit ideas for projects on a continuing basis. All three services require that before a project can be considered for funding, prospective users of the technology endorse the projects. DLA relies on regular dialog with its supply service centers to raise issues related to manufacturing technology for the programs for which it is responsible.

Table 3 further details how the services and DLA identify, select, and fund their projects.

Table 3: Description of How the Services and DLA Select and Fund Projects

Navy	Annually, each systems command submits prioritized lists of ManTech requirements to the Office of Naval Research (ONR) to compete for project funds. ONR convenes an integrated process team consisting of representatives from ONR and each of the systems commands to assess the submissions and develop Navy-wide ManTech requirements by Center of Excellence. Evaluation criteria include things such as projected returns on investment, non-financial benefits, technology feasibility, implementation plans, and cost sharing. ONR then develops a draft program plan based on the ManTech requirements as assessed by the team and anticipated funding allocated for the Centers of Excellence. The draft plan contains potential projects for funding and ONR tasks the appropriate centers to develop a detailed project planning document for the highest priority projects. Once appropriations are received, ONR selects projects for funding based on final funding allocations to the centers and an analysis of the detailed project plans submitted by the centers.
Army	In August 1997, in response to growing Army manufacturing needs and comments from DOD and the Congress, the Army revised its process. The new process included multiple levels of approval for projects. The Army also began to place greater emphasis on the costs and benefits of ManTech projects, requiring a validated economic analysis of the projected return on investment for each project, and for some projects, requiring a 25 percent cost share by program managers. According to the Director of the Army's ManTech Program, requiring a cost share from the program manager ensures participation in the process, facilitates implementation, and allows the Army to leverage its scarce funds. The Director stated that requiring an analysis of the return on the investment helps to screen from consideration projects that might be financially risky. The Army issued annual guidance and called for projects to be funded in the fiscal year after next. [4] For example, in the first quarter of fiscal year 2000, the Army called for projects to be started in fiscal year 2002. ManTech offices in each of the major subordinate commands, depots, and laboratories submitted their ideas for projects to the Director, Army ManTech Program. Ideas originated from the program or project offices charged with developing a weapon system, from item managers at the depots responsible for maintaining the systems, and from engineers at Army research laboratories. The prospective users of the technology, however, must ultimately commit to implement the proposed projects, which must undergo an evaluation process. Projects meeting the minimum criteria are then evaluated based on • the maturity of the technology, • the confidence the project will be completed within the timeframe and budget proposed, • the confidence the projected benefits will be achieved and the project will be implemented, and • the potential return on the investment. Finally, a working group consisting of senior level Army science and technology officials selects projects for funding. The major subordinate command that proposed the projects carries them out with funding the Army allocates on the basis of the work to be done at each command.

[4] According to the Army ManTech Director, the Army did not issue guidance in fiscal year 2001 or call for data for any new starts in fiscal year 2003 because of a backlog of projects already approved for funding but for which sufficient funding was not available. The last data call was in the first quarter of fiscal year 2000.

Air Force	The Air Force does not issue formal guidance for project identification or selection, nor does it formally call for needs on an annual basis. Instead it relies on frequent contact with users and industry to identify needs. The Air Force has structured its program by locating ManTech representatives at major systems program offices, air logistics centers, research laboratories, and product centers. According to the Chief, Manufacturing Technology Division, this provides opportunities for regular discussions with users concerning their needs. The Air Force process includes an analysis of both financial and non-financial benefits. Air Force ManTech program officials screen the needs and identify projects for possible funding. Then the Air Force Associate Director for ManTech and Affordability selects the projects to be funded. The Air Force office responsible for managing the ManTech Program operates in teams representing various areas such as air vehicles, sustainment, weapons, space vehicles, and agile combat support. The teams assess the requirements identified by the system program offices, air logistics centers, and industry. ManTech program officials are either team leaders or members. The teams solicit requirements from users and industry and report those requirements twice a year. In addition, Air Force ManTech branch chiefs and engineers maintain constant contact with users at system program offices and air logistics centers to identify their needs. Annually, the Air Force ManTech program manager hosts a conference to lay out a roadmap for the year. Industry also presents their ideals/solutions. Based on the input they receive from these various sources, Air Force ManTech engineers and branch chiefs consider a list of potential projects. They seek to identify the most important issues that would help drive the cost down, have multiple system applications, and have commitment to implement from users. Another source of ideas for ManTech projects is from representatives of the Materials and Manufacturing Directorate that are co-located with system program offices, Air Force product centers, air logistics centers, and Air Force Research Lab directorates. By working in the program offices, these co-located representatives provide a direct link between the user and the ManTech Program. They keep the ManTech office informed of the manufacturing needs of the offices/programs in which they are assigned. Often, these needs can be satisfied with 1-year, rapid response projects. The Air Force ManTech program office sets aside a minimum of $1 million a year to cover such projects. For example, in fiscal years 2000 and 2001, the ManTech office funded one rapid response project each year. One project improved the manufacturing process used to make major components of the missile fuselage, and the other project developed a lighter engine rotor to be used in all future turbine engines. The number of rapid response project new starts is limited depending on funding availability.
DLA	According to the DLA ManTech program manager, most of DLA's projects result from regular contact with the field supply centers responsible for managing DLA's programs. DLA ManTech officials hold workshops with the users to determine what their needs might be. At the time DLA is formulating its budget, the ManTech program manager briefs senior DLA officials about the proposed ManTech Program and any proposed ManTech projects must compete against other science and technology requirements. When DLA receives its funding, it allocates an amount to the ManTech Program for execution of proposed projects. The ManTech program manager must decide how to allocate the funds DLA has provided.

Some factors limit the extent to which the services and DLA can respond to certain needs. Those limitations include canceling some projects that have not yet been started, terminating projects already underway, or postponing projects already approved for funding because of insufficient funding. For example, the Navy conducts its program through a network of Centers of Excellence and allocates program funding based on what each center received in the past. This strategy helps all of the centers remain viable through the life of their contracts, but demands for projects at a particular center in any given year may be greater than funding at that center. This outcome may result in some projects not being funded, and therefore some users' most urgent ManTech needs may not be met. For example, for fiscal year 2001, two lower priority Naval Sea Systems Command projects were selected for funding because the command's

higher priority projects were for Centers of Excellence with insufficient funds to meet all demands.

Also, several Army and one ManTech official in the Office of the Under Secretary of Defense whom we talked to expressed concern about the Army's requirement for a program manager cost share on certain projects and a validated cost analysis on all projects. Two of the officials believed that there were projects that would benefit Army weapons systems but would not be selected for funding because (1) it was not possible to obtain a program manager cost share, or (2) a validated cost analysis could not be done for projects with environmental, health, or safety benefits. According to the officials, these projects would help meet user needs by reducing the total cost of ownership or improving the quality of weapons systems. However, our review of a number of Army projects did not reveal any that fell into these categories. Another Army ManTech official and an official from the Office of the Under Secretary of Defense believed that validated cost analyses served a useful purpose in weeding out projects without measurable financial benefits. One official expressed concern about the extent to which the Army relies on validated cost analyses to select projects for funding. The other official did not think the cost analysis was the best or only way to screen projects. However, neither official had alternative suggestions.

Additionally, Air Force ManTech officials expressed concern that users' future needs may not be met to the same extent as they have been in recent years. This is because the Air Force Materiel Command may have to absorb a budget shortfall of $100 million in science and technology funding, which includes the ManTech program. As a result, the Materiel Command proposes reducing the Air Force ManTech Program by more than a quarter over the next 5 years between fiscal years 2003 and 2007 or $77.6 million in total. According to ManTech managers, the Air Force may have to terminate some on-going projects and/or cancel planned projects to address the funding shortfall.

Most of the Work Awarded Under the ManTech Program Is Competed

For the most part, the services and DLA awarded work performed under the ManTech Program using competitive procedures. Of the 36 contracting actions we reviewed, 10 were awarded without competition. In each case, there was a documented justification to award the work on a sole source basis. Table 4 further illustrates the extent to which the services and DLA award their projects competitively and details the rationale for specific sole source awards.

Table 4: Extent to Which the Services and DLA Use Competition

Navy	The Navy manages its ManTech Program through competitively awarded contracts to Centers of Excellence for the development, management and execution of individual projects. We reviewed all seven of the contracts. The centers serve as corporate residences of expertise in particular technology areas and have established consortiums of industry partners crucial to the production of defense systems. The centers are not-for-profit military organizations, corporations, institutes or universities with an interest in furthering technology innovations in manufacturing. These centers provide the day-to-day management and execution of the individual ManTech projects for the ONR. The Navy currently holds 5-year contracts or cooperative agreements with 7 of the 9 centers and solicits bids for the continuation of the centers every 5 years with the issuance of Broad Agency Announcements in the Commerce Business Daily. The ONR conducts an Industry Day after the announcement is published to foster interest by potential bidders and provide them an opportunity to ask questions about the centers. In three cases, the Navy received only one bid in response to the announcements and in other cases two or three bids. The Energetics Manufacturing Technology Center, operated by the Naval Surface Warfare Center, Indian Head Division, does not need a contract since it is a Navy organization. The Institute for Manufacturing and Sustainment Technologies is operated by the Applied Research Laboratory, Pennsylvania State University. The Naval Sea Systems Command has an existing contract with the laboratory for a broad range of research and development work, and the ONR funds the center through means of a task order under this contract. Some centers have the capability to conduct some or all of the projects in their own facilities while others do not. For work which cannot be performed in-house or by one of the centers' consortium or industry partners, subcontracts are awarded. We identified the policies of five of the centers on competing projects to subcontractors and found variations among them. For example, the Navy Joining Center performs about 60 percent of the joining projects in-house. For the remaining 40 percent, the Joining Center most often uses the industry partners that make up its consortium. In some cases, the center may request bids from industry outside the consortium in areas where the consortium members lack expertise. In those cases the subcontracts are competed. The Gulf Coast Region Maritime Technology Center, operated by the University of New Orleans College of Engineering, expends 50 percent of its project funds in-house and competitively subcontracts with industry the remaining 50 percent in accordance with Louisiana's state acquisition regulations.
Army	Of the 14 Army contracting actions we selected for review, we found that the Army awarded about one half of them competitively, including contracts that resulted from projects the Congress had designated for additional funding. Four of the six contracting actions that were not competed had been justified for award on a sole source basis and contained supporting documentation in the contract files. For example, one contract resulted from an unsolicited proposal. The justification for awarding the contract without competition stated that the proposal demonstrated unique concepts that could defeat enemy targets. No action was taken to increase competition because the contractor was the only one determined to possess unique capabilities. The contract was awarded on the basis that no other supplies or services would satisfy requirements. Another contract was awarded as a follow-on to a previous contract that had been competed. The justification for awarding the contract through other than full and open competition cited the necessity of maintaining an essential capability for engineering, development, or research. The contracting officer attempted to identify other qualified sources by conducting a market survey and publishing the proposed acquisition, but the only proposal received was from the incumbent contractor. Circumstances surrounding two additional contracts were similar in that attempts had been made to increase competition by publishing a solicitation. Finally, two other projects were awarded through task orders under an existing Air Force task order contract. Although there were three potentially qualified sources for both tasks, only one source was given the opportunity to propose. In both situations, the Air Force determined that only one contractor had the capability of providing the effort required at the level of quality required because the effort was unique and highly specialized.

Air Force	Of the 13 Air Force contracting actions we reviewed, we found that the Air Force awarded two-thirds of them competitively. One contract was not competed because according to the contracting official, no other company or team had the unique capability to research application techniques and apply them to an actual production line. In addition, the official concluded, based on conference report language, it was Congress' intent to fund this research with that contractor.[5] A second contract was awarded on a sole source basis to the company that owns the manufacturing process. Based on documentation in the file, the agency justified the sole source award because it was necessary to maintain an essential engineering, research, or development capability. Two other projects were awarded as task orders under an existing task order contract. Although there were three potentially qualified sources for both tasks, only one source was given the opportunity to propose. In both situations, the Air Force determined that only one contractor had the capability of providing the effort required at the level of quality required because the effort was unique and highly specialized.
DLA	Both of the contracts we reviewed were awarded on a competitive basis. For example, the agency issued a broad agency announcement seeking research proposals to improve all phases of combat ration manufacturing technology. As a result, DLA awarded competitive contracts to a number of commercial food producers and academic institutions. DLA similarly competed a contract to investigate innovative approaches that enable advances in the manufacture of apparel.

DOD Is Missing Opportunities to Conduct More Joint Projects and Cannot Effectively Measure Success

DOD is not managing the ManTech Program as efficiently and effectively as possible. Specifically, it is not conducting as many joint projects as it could and therefore is missing opportunities to leverage the limited funding available for ManTech projects. Additionally, DOD does not effectively measure the program's success.

More Joint Projects Would Better Leverage Limited Funding

Joint projects are those that are jointly funded; have planned implementation benefiting more than one component; or are managed with joint decision-making. These projects allow the services and DLA to leverage their programs by sharing the financial and managerial burdens for projects that can benefit more than one defense component. This is especially important given the limited ManTech budget and the small number of new projects each year that are approved for funding.

For example, one currently funded joint project is expected to achieve affordability goals for forged components used on fighter aircraft. The project is expected to benefit the Joint Strike Fighter, the Navy's F/A-18, and the Air Force's F-22. The Navy's National Center for Excellence in

[5] Direction in conference report language alone does not provide sufficient authorization to award a contract to a specific source without competition.

Metalworking Technology is managing this project and both the Navy and the Air Force are providing ManTech funds. Another project is expected to achieve significant cost reductions by further developing composite friendly aircraft designs, simulation tools, and material and manufacturing processes. The Air Force, the Navy, and the Army are contributing funds for this project.

In fiscal year 2001, joint projects represented 16 of 124 projects, or only 13 percent of all projects reviewed last year. Another 84 projects, or 68 percent, had potential to benefit more than one DOD component, but were not otherwise joint projects.[6] For example, one project would improve, demonstrate, and implement a process for coating electrical circuits to seal them against dirt and moisture, which would increase the reliability of the circuits. This Army project would benefit a number of Army missile systems, such as the Javelin and the Patriot Advanced Capability-3, and the Program Executive Office for Army Tactical Missiles will contribute $750,000 over a 4-year period. In addition, the project could benefit various Air Force and Navy missile systems. Also, according to the Navy ManTech Director, more DOD-wide benefits could accrue through more joint participation in the Best Manufacturing Practices Center of Excellence. The objective of the center is to improve the quality, reliability, and performance of the U.S. defense industrial base. The center identifies and disseminates best practices used by industry to foster technology transfer and improve the competitiveness of the industrial base thereby improving cost, schedule and product performance. The Associate Director, Manufacturing Technology & Affordability, in the Office of the Deputy Under Secretary of Defense (Science & Technology), Office of Technology Transition agreed that more joint programs would help the services and DLA leverage their funding and would facilitate the transfer of technology resulting from ManTech efforts.

The Joint Defense Manufacturing Technology Panel, the organization DOD has charged with the joint oversight of the ManTech Program, recognizes the importance of jointly funded and managed programs. Annual reviews of on-going projects conducted by various subpanels include, among other things, identification of the degree to which all projects are joint. Current guidance does not require projects already funded and in process be

[6] The number of joint programs was determined by the fiscal year 2001 review of on-going projects conducted by the various subpanels under the Joint Defense Manufacturing Technology Panel.

reviewed for joint participation, but the panel is revising the guidance to include a review of projects that are being considered or have been selected for funding but have not yet started. However, the draft guidance states that these types of projects would not be rated for their degree of jointness. Proposed topics for review would include a discussion of competing technologies or approaches and related work underway or completed, but stops short of identifying potential projects for joint funding or management.

Tracking Project Outcomes Past Initial Implementation Would Enhance Program Assessment

DOD does not know the full extent of the success of the ManTech program because it does not track the outcomes past the initial implementation. Statute requires[7] that DOD prepare an annual report for the Congress that includes, among other things, an assessment of the effectiveness of the ManTech Program, including a description of all completed projects and plans and status of implementation of the technologies and processes being developed under the program. For each project listed, the report lists the objective for the project, the completion date, the amount of ManTech funding for the year, the potential beneficiaries for the project, the implementation site, and the expected return on the investment in terms of future cost avoidance. Nevertheless, while the report responds to a congressional requirement, it falls short of validating the long-term benefits predicted for the ManTech program. And currently, DOD lacks a methodology and process for doing so.

The ManTech Program could be assessed by providing contractors with a financial incentive to track and report project results or by evaluating project proposals based on a contractor's plans to track and report on implementing it. In addition, DOD could periodically commission an independent survey or study. An external review of the ManTech Program in 1998 stated that while the data on the return on investment for selected projects was impressive, DOD should seek review by an independent third party of projects at the service and agency level. By tracking and validating the long-term benefits of the program, DOD would be able to measure the actual return on investment of a particular project. The department would also know what technologies had been successfully transferred and the extent to which the ManTech Program improved the quality of weapons systems. Without soliciting an independent review or developing a standard for quantifying benefits, DOD cannot be sure that the ManTech

[7] 10 U.S.C. 2521(e)

Program is providing the financial benefits that have been estimated or that users' long-term needs are being met. Further, it will not have a reliable basis for making decisions on its budgetary priorities and tradeoffs.

Conclusions

The Navy, Army, Air Force and DLA all have processes that include users in establishing requirements for ManTech programs. Each service and DLA, however, separately selects, funds, and implements their ManTech program. While users report that the program has been meeting their technology needs, some ManTech officials expressed concern that funding was insufficient. At the same time, however, DOD has not been fully taking advantage of opportunities to leverage funding by conducting joint projects. The Joint Defense Manufacturing Technology Panel's effort to revise its guidance on reviewing planned ManTech projects should provide an opportunity to identify candidates for joint funding and implementation. Finally, DOD does not currently have an effective means to measure the results of completed projects. Without a means for determining project benefits, DOD will not know whether the ManTech program is meeting the long-term needs of users.

Recommendations for Executive Action

DOD and the services need to build on existing efforts to identify and conduct joint ManTech projects. The Joint Defense Manufacturing Technology Panel's proposal to get involved earlier and review the services' planned projects is a constructive step forward toward facilitating more joint projects. We recommend that DOD develop additional measures to coordinate the services' planning cycles, budgets, and project selection criteria to better position them to identify and conduct joint projects.

We also recommend that DOD develop a more systematic means for determining the results of ManTech projects. This may be done, for example, by (1) using an award or incentive fees to motivate contractor tracking of ManTech benefits over time, (2) including a requirement to track and report implementation as an evaluation criterion for awarding ManTech work, or (3) conducting or contracting for periodic surveys and/or studies of the industrial base to quantify the impact of ManTech projects.

Agency Comments and Our Evaluation

In written comments on a draft of this report, DOD partially concurred with our first recommendation on the need to build on existing efforts to conduct joint ManTech projects and concurred with our second recommendation on the need to develop a more systematic means to determine the results of ManTech projects. With respect to the first recommendation, DOD emphasized that the Joint Defense Manufacturing Technology Panel already provides an effective model for how to plan, coordinate, execute, fund, and implement joint ManTech activities and that this warrants positive recognition. DOD further stated that in comparison to other DOD programs that are overseen at the Office of the Under Secretary of Defense level but funded by the military services and defense agencies, the implementation of "only" 16 joint projects should be viewed in a more positive context. However, DOD acknowledged that more could be done to improve the process for developing joint projects. Toward that end, the panel is modifying its process and will review projects that have not yet started or that have recently begun and will rate these projects on the degree to which they are joint. In addition, DOD stated the panel will review the services' and DLA's planning cycles to identify opportunities for more effective coordination of planned projects.

We agree that the Joint Defense Manufacturing Technology Panel has helped to improve the coordination of the services and DLA programs and facilitate the implementation of certain joint projects. For example, the 16 jointly funded active projects are evidence that DOD does jointly plan and conduct ManTech projects. However, we continue to believe that additional opportunities exist for pursuing joint projects. This is reflected in the fact that the Panel identified another 84 active projects that could benefit more than one DOD component but were not jointly funded, planned, or managed. The Panel's new review process is a step in the right direction to facilitate more joint projects. However, as with the old process, projects will be reviewed for jointness only after the services and DLA have already selected them for funding. This could limit the extent to which a project can be jointly planned, funded or managed since it is likely the requirements have already been determined. The action initiated by the Joint Defense Manufacturing Technology Panel to review the components' planning cycles is also a positive measure, provided that the results are used to facilitate more joint planning earlier in the process.

DOD also provided technical comments that we incorporated into the report as appropriate. DOD's comments appear in appendix II.

We will send copies of the report to the Chairmen and the Ranking Minority Members of other appropriate congressional committees; the Secretary of Defense; and the Director, Office of Management and Budget; and other interested parties. We will also make copies available to others on request.

Please contact me at (202) 512-4841 or John Oppenheim at (202) 512-3111 if you or your staff have any questions concerning this report. Other major contributors to this report were Myra Watts Butler, Cristina Chaplain, Dayna Foster, Gaines Hensley, and Stephanie May.

Sincerely yours,

Allen Li
Director, Acquisition and Sourcing Management

Appendix I: Scope and Methodology

To determine if projects funded by the program are responsive to the needs of the military services and the Defense Logistics Agency, we reviewed the processes, policy memoranda, and guidance for identifying manufacturing needs, prioritizing those needs and presenting them for consideration for funding at both the systems command ManTech program director level and the weapon system program office level. We discussed various manufacturing technology-related issues including overseeing responsibilities with officials from the Office of the Deputy Under Secretary of Defense (Science & Technology), Office of Technology Transition; the Office of the Under Secretary of Defense for Acquisition and Technology, Deputy Under Secretary of Defense for Science and Technology; the Office of the Deputy Assistant Secretary of the Army for Research and Technology; the Office Naval Research; and the Office of the Assistant Secretary of the Air Force (Acquisition), Science, Technology, and Engineering.

At the ManTech program director level, we reviewed memoranda, guidance, and processes for identifying manufacturing needs, prioritizing those needs and project formation. We also met with management officials responsible for implementing the ManTech Program. For example, we met with officials from the Office of Naval Research, Industrial and Corporate Programs Detachment, Manufacturing Technology Program Office, in Arlington, Virginia and Philadelphia, Pennsylvania; the Army Research Laboratory, Aberdeen Proving Ground, Maryland; the Air Force Research Laboratory, Materials and Manufacturing Directorate at Wright Patterson Air Force Base, Ohio; and Defense Logistics Agency at Fort Belvoir, Virginia.

To further assess user's satisfaction, we spoke directly with ManTech users concerning their involvement in the ManTech Program and whether the projects were meeting their needs. However, we did not validate reported successes of the program. We identified the users from a selected number of active projects in fiscal year 1999 and 2000 for the Navy, Army, Air Force and Defense Logistics Agency. Specifically, for the Navy, we met with officials of various program executive offices and program managers from the Naval Sea Systems Command at Arlington, Virginia; the Naval Air Systems Command at Patuxent River, Maryland; and the Marine Corps Systems Command at Quantico, Virginia. For the Army, we met with representatives from several missile and aviation weapon systems at the Army Aviation and Missile Command located in Redstone Arsenal, Alabama; the Army Armaments Research and Development Center in Picatinny Arsenal, New Jersey; the Army Materiel Command in Alexandria, Virginia; the Air and Missile Defense Program Executive Office in

Huntsville, Alabama; the Aviation Program Executive Office at Redstone Arsenal, Alabama; and Ground Combat Support Systems Program Executive Office at Picatinny Arsenal, New Jersey. For the Air Force, we met with representatives from the Joint Air-To-Surface Standoff Missile Program and the Joint Direct Attack Munitions Program at Eglin Air Force Base, Florida; the Joint Strike Fighter Program, F-119 Engine Program, the Engine Directorate, and Air Force Materiel Command Logistics office at the Wright Patterson Air Force Base, Ohio.

To determine whether work being performed under the ManTech Program is being awarded on a competitive basis, we first reviewed the guidance and policy for competitive awards. We interviewed contracting officials as well as engineers who manage ManTech projects to obtain their views concerning specific projects. To assess the degree to which projects are awarded competitively, we randomly selected a sample of ManTech projects from the above list of fiscal years 1999 and 2000 projects for the Army, Navy, Air Force and DLA based on levels of funding, length of the projects, and varying types of technologies and weapons systems. We then reviewed the contract files to determine whether competitive award procedures were used. Because of the way the Navy is organized, we also selected five of nine centers of excellence and reviewed their policies, guidance and processes on competing projects. Specifically, we visited the Center of Excellence for Composites Manufacturing Technology (South Carolina Research Authority) in North Charleston, South Carolina; Electronics Manufacturing Productivity Facility (American Competitiveness Institute) in Philadelphia, Pennsylvania; Navy Joining Center (Edison Welding Institute) in Columbus, Ohio; National Center for Excellence in Metalworking Technology (Concurrent Technologies Corporation) in Johnstown, Pennsylvania; and Gulf Coast Region Maritime Technology Center (University of New Orleans College of Engineering) in New Orleans, Louisiana. We obtained the legal advice of our General Counsel on questionable sole source projects.

Appendix II: Comments From the Department of Defense

OFFICE OF THE DIRECTOR OF
DEFENSE RESEARCH AND ENGINEERING
3040 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-3040

SEP 10 2001

Mr. Allen Li
Director, Acquisition and Sourcing Management
U.S. General Accounting Office
441 G. Street, N.W.
Washington, D.C. 20548

Dear Mr. Li:

This is the Department of Defense (DoD) response to the GAO draft report, 'DEFENSE ACQUISTION: Manufacturing Technology Program Is Meeting User Needs', dated August 8, 2001 (GAO Code 120057/GAO-01-943).

Our response is in two parts. Comments for correcting or clarifying GAO comments and editorial suggestions are at Enclosure 1. With respect to GAO's first recommendation to coordinate the services' planning cycles, budgets, and project selection criteria to facilitate more joint projects, the DoD partially concurs. We concur with the second recommendation on the need to develop a more systematic means for determining the results of Manufacturing Technology projects. Our detailed response to both recommendations is at Enclosure 2.

My focal point is Mr. Dan Cundiff, 703-696-4787, email: dan.cundiff@osd.mil.

Charles J. Holland
Acting Deputy Under Secretary of Defense
(Science and Technology)

Enclosures
As stated

cc:
OUSD(AT&L)ARA (Ms. Diane Carroll)

GAO DRAFT REPORT DATED AUGUST 8, 2001
(GAO CODE 707540/GAO-01-943)
"DEFENSE ACQUISITION: MANUFACTURING TECHNOLOGY PROGRAM IS MEETING USER NEEDS"

DEPARTMENT OF DEFENSE COMMENTS
TO THE GAO DRAFT RECOMMENDATIONS

RECOMMENDATION 1: The GAO recommended that the DoD develop additional measures to coordinate the services' planning cycles, budgets, and project selection criteria to better position them to identify and conduct joint projects. (p. 17/GAO Draft Report)

DOD RESPONSE: Partially Concur. The Joint Defense Manufacturing Technology Panel (JDMTP) has been held up as a model for how to conduct "jointness." Each of the prior year senior level independent teams, or Technology Area Review and Assessment panels, has commended the ManTech joint activities as a model that should be emulated by other S&T Reliance panels. This includes responsibilities for planning, coordinating, executing, funding, and implementing joint programs. As sited by the GAO, 100 out of 124 active projects planned last year (or about 80 percent) have implementation benefiting more than one service. This satisfies not only the JDMTP criteria, but the Project Reliance criteria established by the S&T community to promote and assess the level of jointness across all the Defense Technology areas. Accordingly, the DoD feels this warrants positive recognition. Certainly more can be done to improve the process for developing joint programs. However, compared to virtually any other DoD program which is overseen at the OSD level, but whose funds reside in the Military Services and Defense Agencies, the fact that "only" 16 active projects last year were jointly funded deserves to be placed in a more positive context – not as a programmatic shortfall as noted on pages 3 and 15 of the draft report.

In the spirit of continuous improvement, however, the DoD concurs with the GAO's observation, as stated on page 17, for the need to build on existing efforts to identify and conduct joint ManTech projects. The JDMTP has recently taken action to further enhance its focus on jointness by modifying its portfolio review process to require that projects that are planned and not yet started or have started very recently, identified by the JDMTP as Type A projects, are rated for their degree of jointness. The objective is to improve jointness and leveraging by the early identification in the life cycle of a project of opportunities for collaborative effort, or identifying related work that is contemplated, underway, or completed that can be leveraged. Feedback from the portfolio review process will be provided to the JDMTP principals, i.e., the service and DLA ManTech Program directors, so that appropriate action can be taken to facilitate jointness. In addition, the JDMTP has initiated action to look at the services' and DLA's planning cycles to see if common points/windows exist where new/upcoming Type A projects and joint opportunities can be more effectively addressed by the principals.

RECOMMENDATION 2: The GAO recommended that the DoD develop a more systematic means for determining the results of ManTech projects. (p. 17/GAO Draft Report)

DOD RESPONSE: Concur. As discussed with the GAO representatives during the review, this is a most difficult issue. DoD's position is the ManTech program has a valid process in place to track and monitor the results of project implementation with the initial customer, or recipient of the manufacturing technology. GAO acknowledged this, at least in part, in recognizing the DoD submits the results of implementation annually in the Five-Year Plan to Congress. The challenge is putting a cost effective system in place that does not significantly erode the cost avoidances or savings achieved by the affordability attributes of the ManTech project being tracked, or significantly burdening the implementing project sponsor with undue bureaucratic or costly reporting requirements.

In the past year, the JDMTP chartered a working group to review current DoD techniques and lessons learned relative to benefits assessment and return on investment analysis, and to develop an affordable and effective methodology for providing credible evidence of the benefits accruing from the ManTech Program. Preliminary recommendations have been presented to the JDMTP and are being considered. In addition, the JDMTP subpanels were tasked to review projects recently completed during the course of their annual portfolio reviews with the objective of gathering and disseminating lessons learned and enhancing technology transition. The JDMTP will continue these activities and expects to settle on the details of an appropriate and comprehensive strategy within the next year.

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